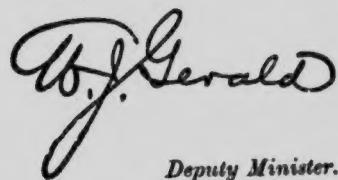


O. H. M. S.


W. J. Gerald

Deputy Minister.

LABORATORY

OF THE

INLAND REVENUE DEPARTMENT

OTTAWA, CANADA

BULLETIN No. 184

GROUND GINGER.

LABORATORY
OF THE
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GROUND GINGER.

OTTAWA, July 16, 1909.

W. J. GERALD, Esq.,
Deputy Minister of Inland Revenue.

SIR.—I beg to hand you a report concerning 150 samples of ground ginger, collected throughout Canada in April of the present year.

Previous reports upon ginger are found in Bulletins No. 48 (1896), No. 95 (1904) and No. 137 (1907). The following tabulation of results is interesting:—

	Total samples examined.	PERCENTAGES.		
		Genuine.	Adulterated.	Doubtful.
Bull. 48—1896.....	98	67	28	
" 95—1904.....	10	60	40	
" 137—1907.....	30	97	0	
" 184—1909.....	150	65	21	1

The usual recognized adulteration of ginger consists in the substitution of cheaper materials (flour, starch, &c.) or in the use of exhausted rhizomes, i.e., stock from which the valuable principles have been more or less completely removed by washing. The examinations which form the basis for reports above referred to, have regard primarily to the detection of adulteration as described. But each report contains an account of more or less investigatory work, undertaken in the desire to put on record such data regarding ginger as should, at some future time, enable us to recommend the adoption of a definition of ginger, based upon its physical and chemical constants, and comprehensive enough to warrant its being made legal, under Section 26 of the Adulteration Act.

A definition of ginger recommended by the United States Food Standards Committee, is as follows:—Ginger is the washed and dried or decorticated and dried, rhizome of *Zingiber Zingiber* (L) Karst., and contains not less than forty-two (42) per cent of starch, not more than eight (8) per cent of crude fibre, not more than six (6) per cent of total ash, not more than one (1) per cent of lime, and not more than three (3) per cent of ash insoluble in hydrochloric acid."

"Limed ginger, bleached ginger, is whole ginger, coated with carbonate of lime, and contains not more than ten (10) per cent of ash, not more than four (4) per cent of carbonate of lime, and conforms in other respects to the standard for ginger."

The British Pharmacopeia describes ginger as "The scraped and dried rhizome of *Zingiber officinale*, Roscoe"; and gives the physical characters of the rhizome; but does not mention ground ginger, nor attempt any enumeration of chemical characters. (Edn 1898). Squire's Companion (Edn of 1908) gives the following tests for ginger:—The cells contain resin, (and) pyriform compressed starch grains 12 to 40 μ m. long, appearing linear when seen laterally, having the hilum at the smaller end; thin walled, polyzonal parenchymatous cells, and sometimes septate bast fibres with irregularly nodose extremities. When unbleached yields 3 to 4 per cent ash, and 5 per cent should not be exceeded. Not less than 1.5 per cent soluble ash. Extractive matter to cold water usually about 10 per cent and should not be less than 8.5 per cent; the extractive matter soluble in 90 per cent alcohol usually amounts to about 5 per cent and should not be materially below this figure."

It is apparent, from these citations, that we have but a very vague and indefinite knowledge of ginger; and it may be well to synoptize the main points brought out by the research work reported in the Bulletins from this laboratory.

Bulletin No. 48 contains photomicrographic reproductions of genuine and adulterated gingers, magnified 225 diameters, and seen under polarized light. The differences between ginger starch, and such starches as are commonly employed in adulteration of ginger, are well shown.

A synoptical table of published results in the chemical examination of ginger is furnished, and the following conclusion reached. "An examination of these results shows that no single component of ginger is sufficiently constant in amount to make the identification of a sample as genuine possible by its means."

Analytical numbers concerning 98 samples include moisture, cold water extractive, total ash; and in certain cases, petroleum ether and alcohol extractive, soluble ash, and alkalinity of ash.

Samples are only condemned as adulterated, in cases where foreign starch in amount exceeding 10 per cent is found.

Bulletin No. 95 reports only 10 samples of ground ginger; giving moisture, cold water extractive and results of microscopic examination. One sample is condemned as containing wheat starch. Three others are called in question as giving only 14.1, 15.3, and 14.9 per cent extractive to cold water. These probably contain exhausted ginger, since similar extraction of genuine samples afforded nearly or quite 20 per cent of extractive. But it would be safer to describe these samples as "doubtfully genuine" than as adulterated.

The details for cold water extraction of ginger are given (pp. 24 and 25), and the analyst adds:—"I have not met with an authenticated sample of ginger which gave less than about 19 per cent of extractive to cold water, when treated as described."

Bulletin No. 137 reports upon 30 samples, of which 29 appear to be genuine, as judged by microscopic characters, and the cold water extractive, carried out by the process described above. Extraction amounts to above 20 per cent by weight on the dry ginger, in most samples: and in several reaches 24 per cent.

A consideration of all work recorded for ginger leads to the conclusion that microscopic examination and determination of cold water extractive are quite the most valuable tests that can be applied to the ground ginger of commerce. Determination of ash is rendered comparatively valueless on account of the variability in methods of preparing ginger for the market. The rhizome may be merely washed, or it may be scraped, or decorticated or limed; and ground ginger may result from the grinding of rhizomes prepared in any or all of these ways. The total ash of 64 samples of ginger, believed to be genuine, reported in *Bulletin 48*, varies from 3.60 per cent to 7.14 per cent.

The ash of ginger consists partly of alkaline carbonates, which are soluble in water; partly of earthy carbonates, sulphates, and phosphates, insoluble in water but

easily dissolved by hydrochloric acid, and partly of silicates and sand, insoluble in acid. Extraction of the ginger with water (which is one of the commonest forms of adulteration) has the effect of greatly reducing the amount of soluble ash, yielded by the sample, as shown in the following table:—

Number of Sample.	EFFECT OF WATER EXTRACTION OF GINGER UPON THE AMOUNT AND CHARACTER OF THE ASH.					
	Before Extraction.			After Extraction.		
	Total.	Water Soluble.	Ratio.	Total.	Water Soluble.	Ratio
37584.	5.42	2.18	0.40	3.14	0.65	0.21
37587.	4.65	1.98	0.42	2.25	0.30	0.13
39458.	4.59	2.38	0.52	1.38	0.24	0.18
39464.	3.63	1.86	0.51	0.98	0.15	0.15

A study of these results shows that the total ash is much reduced by previous extraction, as might be expected; and nearly 70 per cent of the diminution in amount is due to a reduction in water soluble ash.

Number of Sample.	EFFECT OF WATER EXTRACTION OF GINGER UPON THE AMOUNT AND CHARACTER OF THE ASH.		
	Total ash reduced.	Soluble ash reduced.	Ratio p.c.
37584.	2.28	1.53	69
37587.	2.40	1.68	70
39458.	3.21	2.14	67
39464.	2.65	1.71	65

The samples of ginger upon which this work was done appear to be genuine, as evidenced by the microscopic examination, the cold water extractive, and other characters.

The presence of foreign starches or of flour in ground ginger will naturally reduce the total ash, since the normal ash of flour is less than one-half of one per cent, and that of starch practically nil. The ratio of soluble to total ash will be but little affected by addition of starch to a normal ginger.

In the absence of legal recognition of the value of this ratio in discriminating between normal and exhausted ginger, I am unable to make use of it in judging the genuineness of the samples now reported; but I have noted all cases where the ratio falls beyond the limits 0.40 to 0.70, as "abnormal." When the total ash exceeds 6 per cent I have noted "ash high"; when below 3 per cent I have noted "ash low." These terms cannot be regarded as having legal value in establishing the character of the article.

Of course the amount of extractive to cold water will be affected by the method of carrying out the extraction. This is described in Bulletin No. 95, p. 24, as it was employed by me in the work recorded in Bulletins 95 and 137. It involved the use of a mechanical shaker and centrifuge, and genuine gingers yielded about 20 per cent of extractive. The cold water extraction, as now reported, has been made by treating 5 grammes of the sample with 250 cc. of water, in a glass flask, which is shaken by hand at intervals of half an hour during eight hours; allowed to stand over night when an aliquot part by volume of the solution is evaporated in platinum to constant weight. This method is less effective in exhausting the ginger, but has the advantage of being

available in laboratories not equipped with the mechanical devices required for carrying out the first method described. The normal extractive, by this method, appears to be about 15 or 16 per cent of the weight of the ginger (dry).

It is interesting to note that the low extractive recorded in the accompanying table, for certain samples, is usually correlated to the presence of foreign starchy matters. Where a low extractive is not explained by presence of foreign starch, the only explanation available would seem to be the previous extraction of the rhizome.

The requirements of the British Pharmacopeia in the matter of extractive would appear to be entirely too low.

I beg to recommend the publication of this report as Bulletin No. 184.

I have the honour to be, sir,

Your obedient servant,

A. MCGILL,
Chief Analyst.

BULLETIN No. 184--

Date of Collection.	Nature of Sample.	Number of Sample.	Name and Address of Vendor.	Cost.		Name and Address of Manufacturer or Furnisher as given by the Vendor.	Inspector's Report. (Is not an expression of Opinion).
				Quantity.	Gents.		

DISTRICT OF NOVA SCOTIA--

1900.							
April 14	Ground Ginger.	33902	Larder, Hubley & Co., Halifax, N.S.	1 lb.	30	Todhunter, Mitchell & Co., Toronto.	
" 14	"	33903	Knock & Nicolle, Halifax, N.S.	1 lb.	21	John P. Mott & Co., Labelled "Strictly Pure."	
" 14	"	33904	R. W. McDonald, Halifax, N.S.	1 lb.	18	Robt. Greig Co., Toronto.	
" 14	"	33905	E. B. Tracey, Halifax, N.S.	1 lb.	24	C. H. Cochrane, Ottawa.	" Pure Jamacia"
" 15	"	33906	Jas. Scott & Co., Halifax, N.S.	1 lb.	30	W. H. Schwartz & Son, Halifax.	
" 15	"	33907	E. Donahoe & Son, Halifax, N.S.	1 lb.	21	"	Labelled "Pure"
" 15	"	33908	Dillon Bros., Halifax, N.S.	1 lb.	21	J. P. Mott & Co., Labelled "Strictly Pure."	
" 15	"	33909	W. E. Ford, Halifax, N.S.	1 lb.	20	S. H. Ewing, Montreal	Standard ginger.
" 15	"	33910	W. J. Hopgood & Son, Halifax, N.S.	1 lb.	24	W. H. Schwartz & Sons, Halifax.	Labelled "Pure"
" 23	"	33926	S. Thomson, Dartmouth, N.S.	1 lb.	24	Jno. P. Mott & Co., Halifax.	Labelled strictly pure.

DISTRICT OF PRINCE EDWARD ISLAND--

April 7	Ground Ginger.	31473	R. T. Holman, Ltd., Summerside.	1 lb.	24	Dearborn & Co., St. John, N.B.	Guaranteed absolutely pure.
" 7	"	31474	Brace & McKay, Summerside.	1 lb.	21	Pure Gold Mfg. Co., Toronto.	
" 7	"	31475	McGougan & Wright, Summerside.	1 lb.	24	J. P. Mott & Co., Halifax.	Guaranteed strictly pure.
" 8	"	31476	J. A. Hynes, Kensington.	1 lb.	30	G. E. Barbour & Co., Ltd., St. John, N.B.	"
" 12	"	31477	R. A. McCarthy, Mount Stewart.	1 lb.	24	Carvell Bros., Charlottetown.	"
" 13	"	31478	A. McLean & Co., Georgetown.	1 lb.	24	The Robt. Greig Co., Greig's "White Swan" Brand, Ltd., Toronto.	
" 13	"	31479	J. H. Myrick, Charlottetown.	1 lb.	21	Carvell Bros., Charlottetown.	
" 13	"	31480	W. S. Brown, Charlottetown.	1 lb.	24	W. H. Schwartz & Sons, Halifax.	
" 13	"	31481	M. Duffy & Son, Charlottetown.	1 lb.	30	J. A. Farquharson, Charlottetown.	
" 13	"	31482	Moore & Francham, Charlottetown.	1 lb.	30	N. Rattenbury, Charlottetown.	Perfection brand guaranteed absolutely pure.

DISTRICT OF NEW BRUNSWICK--

Mar. 23	Ground Ginger.	29907	G. E. Barbour Co., Ltd., St. John, N.B.	3 Pkts	24	Vendors.	"Acorn" strictly pure Jamacia Ginger.
" 24	"	29908	Chas. A. Clark, St. John, N.B.	1 lb.	30	Dearborn & Co., St. John, N.B.	
April 6	"	29609	Estate of G. T. Whelpley, Fredericton, N.B.	3 Pkts	30	Pure Gold Mfg. Co., Toronto, Ont.	Whelpley's "High Grade" Pure Ginger.

GROUND GINGER.

Ash.			RESULTS OF ANALYSIS.						Number of Sample.	Remarks and Opinion of the Chief Analyst.
Total.	Water Soluble	Rais.	Moisture.	Cold Water Extractive.	Normal	Calci- lated to dry Ginger	Microscope.			

R. J. WAUGH, INSPECTOR.

p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.				
4.67	2.40	.51	9.94	13.06	14.52	Genuine			33902	
4.35	2.25	.52	10.02	11.70	13.00	"			33903	Extractive low. Doubtful.
3.06	1.57	.51	9.57	13.40	14.82	Wheat, maize, rice, 35 p.c.			33904	Adulterated.
1.89	2.22	.46	10.35	13.20	14.73	Genuine			33905	
4.30	2.40	.56	10.26	15.38	17.14	"			33906	
4.83	2.60	.56	9.82	14.84	16.46	"			33907	
4.37	2.61	.60	9.39	12.95	14.30	"			33908	
3.93	1.70	.43	10.11	11.70	13.01	Wheat starch, 25 p.c.			33909	Extractive low. Adulterated.
3.93	2.17	.55	9.98	15.68	17.42	Genuine			33910	
4.74	2.46	.52	10.49	13.35	14.92	"			33926	

THEO. MOORE, INSPECTOR.

4.13	1.81	.44	10.51	10.00	11.17	Genuine			31473	Extractive low. Doubtful.
4.84	2.82	.58	9.91	14.02	15.56	"			31474	
4.53	2.63	.58	10.60	12.57	14.06	"			31475	
5.13	2.56	.50	10.22	14.65	16.32	"			31476	
5.39	2.91	.54	9.66	14.00	15.50	"			31477	
3.63	2.12	.58	10.36	18.30	20.41	"			31478	
6.82	3.13	.46	10.42	15.90	17.45	"			31479	
2.91	1.84	.63	10.13	13.15	14.62	Wheat and maize, 30 p.c.			31480	Ash low. Adulterated.
2.96	1.73	.58	9.96	13.33	14.80	Maize starch, 15 p.c.			31481	Adulterated.
3.92	1.66	.42	9.75	10.65	11.80	Genuine			31482	Extractive low. Doubtful.

J. C. FERGUSON, INSPECTOR.

3.65	2.44	.67	9.25	16.30	17.96	Genuine			29907	
5.20	2.37	.46	9.56	12.84	14.20	"			29908	
3.30	2.48	.75	9.80	18.38	20.38	"			29909	

Date of Collection.	Nature of Sample.	Number of Sample.	Name and Address of Vendor.	Cost.		Name and Address of Manufacturer or Furnisher as given by the Vendor.	Inspector's Report. (Is not an expression of Opinion).
				Quantity.	Cents.		

DISTRICT OF NEW BRUNSWICK—

1909.							
April 8	Ground Ginger.	29910	D. R. Bedell, Andover, N.B.	3 Pkts	24	G. E. Barbour Co., Ltd., St. John, N.B.	"Acorn".....
" 10	"	29911	F. D. Sadler, Perth, N.B.	4 lb ..	30	S. H. Ewing & Sons, Montreal.	"Prince of Wales".....
" 10	"	29912	The Geo. T. Baird Co., Ltd., Perth, N.B.	4 " ..	24	Dearborn & Co., St. John, N.B.	"Perfection".....
" 14	"	29913	The Sussex Mercantile Co., Ltd., Sussex, N.B.	4 " ..	21	G. E. Barbour Co., Ltd., St. John, N.B.	"Acorn".....
" 14	"	29914	Denis Richard, Moncton, N.B.	4 " ..	24	F. P. Reid & Co., Moncton, N.B.	"Pyramid".....
" 17	"	29915	S. Williamson, Bathurst, N.B.	4 " ..	24	H. W. Cole Ltd., St. John, N.B.	"Thistle".....
" 19	"	29916	B. A. Mowat, Campbellton, N.B.	4 " ..	19	"	.....

DISTRICT OF QUEBEC—

April 21	Ground Ginger.	36883	T. Farlardeau, Quebec.	4 lb ..	30	Langlois & Paradis, Quebec.	.....
" 21	"	36884	C. T. Boily, Quebec.	3 Pkts	15	"	.....
" 21	"	36885	F. X. Goslin, Quebec	3 "	15	H. Blouin, Quebec.	.....
" 21	"	36886	Louis Nadeau, Quebec	4 lb ..	30	Unknown..	.....
" 22	"	36887	A. Pouliot, Quebec.	4 " ..	30	W. Brunette & Cie, Quebec.	.....
" 22	"	36888	E. Emond, Quebec.	4 " ..	30	Unknown..	.....
" 22	"	36889	L. A. Warren, Quebec.	3 Pkts	15	"	.....
" 22	"	36890	Denis Davis, Quebec	4 lb ..	23	"	.....
" 22	"	36891	A. Turcotte, Quebec.	4 " ..	23	E. Montreuil, Quebec.	.....
" 22	"	36892	T. E. Gregoire, Quebec.	4 " ..	30	Drouin & Freres, Quebec.	.....

DISTRICT OF ST. HYACINTHE—

April 19	Ground Ginger.	1017	T. A. Bourgault, Drummondville.	4 lb ..	30	Mayell & Co., Toronto	.....
" 20	"	1018	F. X. Giroux, Farmham.	4 " ..	30	J. A. Mathewson & Pure Jamaica Co., Montreal.	ginger.
" 21	"	1019	R. Goold, St. Jean..	4 " ..	30	Unknown..	.....
" 23	"	1020	W. D. Bradford, Granby.	4 " ..	22	"	.....
" 23	"	1021	A. Bussiere, Abbottford.	4 " ..	25	L. Chaput fils & Cie, Montreal.	Guaranteed pure Jamaica.
" 26	"	1022	H. Ledoux, Beloit.	4 " ..	23	Hudon & Oreali	.....

GROUND GINGER.

ASH			RESULTS OF ANALYSIS.					Number of Sample.	Remarks and Opinion of the Chief Analyst.
Total.	Water Soluble	Ratio.	Moisture.	Cold Water Extractive.	Normal	Calcu- lated to dry Ginger	Microscope.		

J. C. FERGUSON, INSPECTOR—Concluded.

4.50	2.31	.51	9.76	14.84	16.45	Genuine.....	29910	
4.95	2.37	.48	9.32	13.90	15.33	".....	29911	
3.76	1.63	.44	9.53	13.05	14.43	".....	29912	
4.36	2.24	.51	9.66	15.09	16.70	".....	29913	
4.54	1.99	.44	10.05	13.15	14.62	".....	29914	
3.48	2.02	.58	9.42	14.77	16.31	Small amount of wheat starch.	29915	Doubtful.
3.47	2.02	.58	10.04	14.72	16.36	".....	29916	"

E. BELAND, INSPECTOR.

2.63	0.79	.30	9.98	8.20	9.11	Genuine.....	36883	Ash abnormal, low. Extractive very low. Doubtful.
2.58	0.62	.24	9.91	5.25	5.83	".....	36884	"
6.95	1.41	.20	8.60	13.41	14.67	".....	36885	Ash insoluble in HCl. = 1.15. Ash abnormal. Ash high. Extractive low. Doubtful.
4.83	2.82	.58	9.12	14.36	15.80	".....	36886	
3.89	2.30	.59	9.49	16.35	18.06	".....	36887	
1.82	0.74	.41	10.18	7.20	8.02	Maize starch, 15 p.c.	36888	Ash low. Extractive low. Adulterated.
2.56	1.09	.42	8.54	5.84	6.38	Foreign matters, much...	36889	"
2.29	0.33	.14	9.65	5.77	6.38	Maize starch, 50 p.c.	36890	Ash abnormal, low. Extractive low. Adulterated.
2.48	0.74	.30	10.26	7.10	7.91	" 10 p.c.	36891	Ash abnormal, low. Extractive low. Doubtful.
2.02	0.59	.29	10.25	7.50	8.36	" 30 p.c.	36892	Ash abnormal, low. Extractive low. Adulterated.

J. C. ROULEAU, INSPECTOR.

5.00	2.70	.54	9.35	13.50	14.90	Genuine.....	1017	
5.53	1.64	.29	9.33	13.15	14.51	Wheat starch, 15 p.c.	1018	Ash abnormal. Adulterated.
3.63	2.53	.60	9.61	17.00	18.81	Genuine.....	1019	
4.68	2.39	.51	8.48	13.80	15.08	".....	1020	
3.34	2.50	.75	9.71	15.60	17.28	".....	1021	
6.61	0.96	.14	8.70	12.45	13.64	Foreign tissues, not iden- tified.	1022	Ash insol. in HCl. = 1.01. Ash abnormal; high. Adult'd.

Date of Collection.	Nature of Sample.	Number of Sample.	Name and Address of Vendor.	COST.		Name and Address of Manufacturer or Furnisher as given by the Vendor.	Inspector's Report. (Is not an expression of Opinion).
				Quantity.	Cents.		

DISTRICT OF ST. HYACINTHE—

1909.							
" 28	"	1023	Jos. Hamel, Roxton Falls.	1 lb ..	27	"	
May 5	"	1024	J. E. Blais, E. Sherbrooke.	1 lb ..	30	Herron, Leblanc & Co., Montreal.	
" 6	"	1025	W. E. Hetherington, Sherbrooke.	1 lb ..	30	Mayell & Co., Toronto	
" 18	"	1026	A. Desmarais, Pierreville.	1 lb ..	20	Unknown	

DISTRICT OF MONTREAL—

Mar. 22	Ground Ginger.	40001	J. B. Therein, Montreal.	3 tins.	25	The Brodie Mfg. Co., Montreal.	
" 22	"	40002	The Brodie Mfg. Co., Montreal.	1 lb ..	20	Vendors..	
" 27	"	40003	J. J. Duffy & Co., Montreal.	3 pkgs	20	"	
April 15	"	40004	" " "	1 lb ..	20	"	
" 28	"	40005	E. Lavigne, Lachute, P.Q.	1 lb ..	30	Thos. Barrow, Shrewsbury.	
" 28	"	40006	G. L. Meikle, La chute, P.Q.	1 lb ..	30	"	
May 3	"	40007	Heron Leblanc Co., Ltd., Montreal.	1 lb ..	19	Vendors..	
" 6	"	40008	C. E. Laflamme, St. Jerome.	1 lb ..	35	Hudon, Hebert & Cie.	
" 12	"	40009	A. Martel, Montreal	1 lb ..	30	J. V. Boudrais, Montreal.	
" 12	"	40010	A. Genereau, Montreal.	1 lb ..	30	S. H. Ewin & Sons, Montreal.	

DISTRICT OF OTTAWA—

Mar. 19	Ground Ginger.	22926	McCallum & Lahaie, Buckingham.	1 lb ..	23	White Swan Spice & Cereals Ltd., Toronto	Sold as ground ginger.
" 19	"	22927	W. J. Martin, Buckingham.	1 lb ..	23	Unknown	"
" 22	"	22928	G. F. Hodgins, Shawville.	1 lb ..	22	Pure Gold Mfg. Co., Toronto.	"
" 23	"	22929	A. D. Wishart, Renfrew.	1 lb ..	23	The Fielding Chem. Co., Guelph.	"
" 24	"	22930	J. E. Duhaime, Ottawa.	1 lb ..	25	Unknown	"
" 24	"	22931	Wm. R. Cummings, Cummings Bridge.	1 lb ..	30	S. J. Major Ltd., Ottawa.	"
" 24	"	22932	W. Schwitzer, Ottawa.	1 lb ..	22	F. J. Castle Co., Ottawa.	"
" 26	"	22933	Jas. Herbert, Ottawa.	1 lb ..	25	Unknown	"
" 26	"	22934	M. J. Laverdure, Hull.	1 lb ..	30	Pure Gold Mfg. Co., Toronto.	"
" 27	"	22935	M. Joyce, Quyon, P.Q.	1 lb ..	20	Provost & Allard, Ottawa.	"

GROUND GINGER.

ASH.			RESULTS OF ANALYSIS.					Number of Sample.	Remarks and Opinion of the Chief Analyst.
Total.	Water Soluble	Ratio.	Moisture.	Cold Water Extractive.	Normal	Calculated to dry Ginger	Microscope.		

J. C. ROULEAU, INSPECTOR—Concluded.

p. c.	p. c.	p. c.	p. c.	p. c.	p. c.				
10.54	8.49	.80	8.43	16.00	17.47	Foreign matters, 50 p.c.	1023	Ash insol. in HCl. = 0.20. Ash abnormal; high. Adul't'd.	
2.76	1.23	.45	10.49	12.73	14.22	Maize, starch, &c., 35 p.c.	1024	Ash low. Adulterated.	
4.78	2.37	.40	9.83	12.70	14.08	Genuine	1025		
3.82	1.56	.41	10.10	9.40	10.46	Maize starch, small quantity.	1026	Extractive low. Doubtful.	

J. J. COSTIGAN, INSPECTOR.

2.61	0.87	.33	10.08	7.42	8.25	Maize starch, 20 p.c.	40001	Ash abnormal; low. Extractive low. Adulterated.
6.77	1.38	.20	9.61	15.50	17.15	Genuine	40002	Ash insol. in HCl. = 1.30. Ash abnormal; high.
3.35	1.59	.48	9.50	10.80	11.95	"	40003	Extractive low. Doubtful.
3.18	1.96	.62	9.72	12.54	13.89	"	40004	" "
1.42	0.54	.38	9.50	6.32	6.96	Very large quantity rice starch and some wheat.	40005	Ash low. Extractive low. Adulterated.
4.15	2.32	.56	9.57	14.03	15.51	Genuine	40006	
4.17	2.33	.56	9.24	15.18	16.72	"	40007	
1.48	0.58	.39	9.61	8.05	8.90	Maize starch, 40 p.c.	40008	Ash low. Extractive low. Adulterated.
4.50	2.70	.60	9.95	11.79	13.10	Foreign matters, rice, &c.	40009	Extractive low. Adulterated.
4.23	2.19	.51	9.20	13.01	14.27	Genuine	40010	

J. A. RICKEY, INSPECTOR.

2.74	1.20	.44	10.28	14.69	16.37	Wheat and maize starch, 20 p.c.	22926	Ash low. Adulterated.
4.12	2.76	.67	9.67	16.75	18.54	Genuine	22927	
5.60	2.39	.43	9.91	14.30	15.87	"	22928	
4.13	2.97	.72	10.08	16.14	17.95	"	22929	
2.58	1.07	.41	10.04	7.08	7.87	Maize starch, 40 p.c.	22930	Ash low. Extractive low. Adulterated.
3.38	1.04	.31	9.96	11.30	12.55	Wheat starch, 30 p.c. and turmeric.	22931	Ash abnormal. Adulterated.
2.67	1.11	.42	10.00	6.90	7.67	Maize starch, 50 p.c.	22932	Ash low. Extractive low. Adulterated.
3.43	1.06	.31	10.00	11.08	12.31	Wheat starch, 30 p.c. and turmeric.	22933	Ash abnormal. Adulterated.
4.20	2.18	.52	10.02	15.15	16.84	Genuine .....	....
5.17	2.54	.49	9.68	13.26	14.68	" .....	....

Date of Collection.	Nature of Sample.	Number of Sample.	Name and Address of Vendor.	Cost.		Name and Address of Manufacturer or Furnisher as given by the Vendor.	Inspector's Report. (Is not an expression of Opinion).
				Quantity.	Cents.		

DISTRICT OF KINGSTON—

1909.							
Mar. 17	Ground Ginger.	39456	Geo. Gibson, Kingston.	4 lb ..	30	White Swan Co., Toronto.	
" 17	"	39457	J. A. Haffner, Kingston.	4 " ..	30	Fenwick Hendry Co., Kingston.	
" 17	"	39458	J. McCulla, Kingston	4 " ..	30	Todhunter & Mitchel, Toronto.	
" 17	"	39459	J. Lemmon, Kingston	4 " ..	23	Unknown.	
" 17	"	39460	J. A. Donaldson, Kingston.	4 " ..	20	"	
" 17	"	39461	A. T. Morris, Kingston.	4 " ..	20	Dalton, Toronto.	
" 18	"	39462	H. M. Stover, Kingston.	4 " ..	30	A. McLean, Kingston	
" 18	"	39463	C. Litton, Kingston	4 " ..	20	C. H. Cochrane & Co., Ottawa.	
" 22	"	39464	J. Harker, Belleville	4 " ..	30	White Swan, Toronto.	
" 22	"	39	Guillet Bros., Coburg	4 " ..	38	Grig Co., Toronto.	

DISTRICT OF TORONTO—

April 5	Ground Ginger.	36216	W. Durance, Hamilton.	4 lb ..	25	Young & Winfield, Hamilton.	Ground Ginger.
" 7	"	36217	C. C. Baird, Hamilton.	4 " ..	30	Dalton Bros., Toronto	Jamaica Ginger.
" 8	"	36218	T. H. Broad, Aurora	4 " ..	30	J. M. Lowes Co., Ltd., Toronto.	Pure Jamaica Ginger.
" 8	"	36219	Joseph Purdy, Newmarket.	4 " ..	30	Lumsden Bros, Hamilton.	Fine Family Ginger.
" 12	"	36220	W. D. Watson, Bradford.	4 " ..	30	R. B. Hayhoe & Co., Toronto.	Golden Brand Pure.
" 13	"	36221	A. Leadlay, Barrie.	4 " ..	24	F. E. Ramsay Co., Toronto.	"Horseshoe"....
" 14	"	36222	J. E. Paddison, Alliston.	4 " ..	24	F. W. Humphrey, Toronto.	"Bison".....
" 16	"	36223	L. Kennedy, Georgetown.	4 " ..	22	John Sloan & Co., Toronto.	Sloan's Defiance, Pure.
" 17	"	36224	R. Kirkpatrick, Toronto.	4 " ..	27	R. B. Hayhoe & Co., Toronto.	.....
" 17	"	36225	J. Simpson & Son, Toronto.	4 " ..	23	Pure Gold Mfg. Co., Toronto.	Labelled Ginger.

DISTRICT OF LONDON—

Mar. 26	Ground Ginger.	30596	Oman Mallion, Stratford.	4 lb ..	23	Canada Grocery Co., London, Ont.	
" 26	"	30598	Edward O'Flaherty, Stratford.	4 " ..	30	Edward Adams, London, Ont.	
" 26	"	30600	A. Bettie & Co., Stratford.	4 " ..	30	Hamilton Coffee & Spice Co., Hamilton	
" 29	"	30601	Chas. Andrews, Seaforth.	4 " ..	30	A. M. Smith & Co., London, Ont.	
" 29	"	30603	Mathew Williams, Seaforth.	4 " ..	30	John Sloane, Toronto.	

GROUND GINGER.

ASH.			RESULTS OF ANALYSIS.					Number of Sample.	Remarks and Opinion of the Chief Analyst.		
Total.	Water Soluble	Ratio.	Cold Water Extractive.		Microscope.						
Moisture.	Normal	Calculated to dry Ginger									
JAS. HOGAN, INSPECTOR.											

2.84	1.50	53	9.69	13.68	15.15	Maize and wheat starch, 15 p.c.	39456	Ash low. Adulterated.
2.82	1.13	40	10.06	10.80	12.01	Maize and wheat starch, 30 p.c.	394	" "
4.59	2.38	52	10.12	14.60	16.24	Genuine.....	39458	
4.23	0.37	00	9.04	14.35	15.78	Maize and wheat starch, much.	39459	Ash abnormal. Adulterated.
4.19	2.10	50	9.75	12.45	13.79	A little maize starch.....	39460	Doubtful.
3.43	1.27	37	9.68	11.72	12.97	Genuine.....	39462	
5.51	2.70	49	9.47	14.73	16.27	"	39463	
3.36	2.43	72	9.41	16.50	18.22	"	39464	
3.63	1.86	51	10.24	16.56	18.45	"	39465	
3.73	2.16	58	10.12	14.80	16.47	"		

H. J. DAGER—INSPECTOR.

4.36	2.02	46	9.55	13.48	14.90	Genuine.....	36216	
2.24	1.31	50	9.46	10.52	11.62	Maize starch, 40 p.c.	36217	Ash low. Adulterated.
4.70	2.82	60	9.54	15.03	16.62	Genuine.....	36218	
3.58	2.21	62	9.35	16.06	17.72	"	36219	
4.04	2.48	61	10.00	15.06	16.72	"	36220	
3.83	1.85	49	10.03	11.96	13.30	Much maize starch and other foreign matter.	36221	Adulterated.
2.90	1.12	39	9.29	13.88	15.30	Maize starch, 25 p.c.	36222	Ash low. Adulterated.
2.27	1.01	45	9.00	12.75	14.11	" 15 p.c.	36223	" "
4.34	2.00	48	9.46	12.66	13.98	Genuine.....	36224	
4.28	2.28	53	8.85	15.95	17.50	"	36225	

T. KIDD, INSPECTOR.

6.20	2.56	41	10.49	13.82	15.44	Genuine.....	30596	Cao=0.94: Ash insol. in HCl =0.51 Ash high.
4.43	2.41	54	9.91	13.38	14.85	"	30598	
4.52	2.36	52	10.20	13.58	15.12	"	30600	
4.89	2.67	54	9.86	13.42	14.89	"	30601	
3.81	1.37	36	9.82	11.73	13.01	"	30603	Ash abnormal. Doubtful.

Date of Collection.	Nature of Sample.	Number of Sample.	Name and Address of Vendor.	Cost.		Name and Address of Manufacturer Furnisher, as given by the Vendor.	Inspector's Report. (Is not an expression of Opinion.)
				Quantity.	Cents.		

DISTRICT OF LONDON—

1909.							
Mar. 31	Ground Ginger.	30610	Chas. Nairn, Goderich	4 lb.	30	Canada Spice Co., London, Ont.	
" 31	"	30611	O. C. Whitley, Goderich.	" "	30	A. M. Smith & Co., London, Ont.	
April 1	"	30617	Jas. Cutt, Blyth....	" "	30	Canada Spice & Grocery Co., London, Ont.	
" 1	"	30620	W. Bone, Wingham.	" "	30	Elliot Marr & Co., London, Ont.	
" 2	"	30624	J. H. Christie, Wingham.	" "	30	Todhunter & Mitchell, Toronto.	

DISTRICT OF WINDSOR—

April 5	Ground Ginger.	34757	J. Straitich, London	4 lb.	30	Gorman, Eckert & Co., London, O.	
" 5	"	34763	A. G. Lyons.....	" "	25	"	
" 5	"	34765	T. W. Sanborn	" "	30	"	
" 5	"	34769	Duncan Bros	" "	25	Canada Spice and Grocery Co., London, O.	
" 5	"	34770	Cahoon & Patterson.....	" "	30	Gorman, Eckert & Co., London, O.	
" 5	"	34771	S. W. Johnston.....	" "	25	"	
" 5	"	34772	W. Hayes.....	" "	25	"	
" 5	"	34773	G. & O. Bong.....	" "	20	"	
" 6	"	34776	Mrs. Geo. Armstrong.....	" "	25	Canada Spice and Grocery Co., London, O.	
" 6	"	34779	F. C. Toon	" "	25	Gorman, Eckert, & Co., London, O.	

DISTRICT OF MANITOBA—

April 19	Ground Ginger.	35871	D. Koffman, Winni- peg.	3 pks.	25	Campbell Bros. & Wil- son, Winnipeg.	" Royal Shield."
" 19	"	35872	W. H. English, Car- berry.	4 lb.	20	Unknown.....	
" 23	"	35873	I. L. Raymond, Car- man, M.	3 pks.	30	Gorman, Eckert & Co., London, Eng.	
" 26	"	35874	A. H. Atkinson, Del- oraine, M.	4 lb.	20	Unknown	
" 26	"	35875	Stevens & Son, Del- oraine, M.	" "	30	"	
" 27	"	35876	The Macleod Hamlin Co., Napinka.	3 pks.	30	The Blue Ribbon, Ltd., Winnipeg.	" Blue Ribbon."
" 27	"	35877	Kaiser & Dunning, Napinka.	3 "	30	McLaren, Ltd., Ham- ilton.	" Thistle"....
" 28	"	35878	Tessman & Co., Win- nipeg.	4 lb.	20	Unknown	
" 29	"	35879	O. Hughes, Winni- peg.	3 pks.	30	The Blue Ribbon, Ltd., Winnipeg.	" Blue Ribbon."
" 29	"	35880	Whiley's Dept., Store, Winnipeg.	3 "	30	The White Star Mfg. Co., Winnipeg.	" The White Star."

GROUND GINGER.

ASH.			RESULTS OF ANALYSIS.					Number of Sample.	Remarks and Opinion of the Chief Analyst.
Total.	Water Soluble	Ratio.	Moisture.	Normal	Cold Water Extractive.	Calcu- lated to dry Ginger	Microscope		

T. KIDD, INSPECTOR—Conclude I.

				p.c.	p.c.				
3.18	2.14	.67	10.20	15.24	16.99	Genuine.....		30610	
5.08	2.54	.50	9.80	14.06	16.58	".....		30611	
5.79	2.72	.47	10.75	14.90	16.70	".....		30617	
6.16	3.04	.49	10.44	14.94	16.68	".....		30620	Cao=0.56; Ash insol. in HCl =0.61 Ash high.
4.23	2.70	.64	9.75	17.65	19.56	".....		30624	

JNO. TALBOT, INSPECTOR.

3.99	2.68	.67	10.26	14.54	16.20	Genuine		34757	
4.02	2.57	.64	10.07	14.05	15.62	"		34763	
5.16	2.53	.49	9.93	14.82	16.08	"		34765	
5.91	2.70	.46	10.03	14.75	16.50	"		34769	
5.07	2.32	.46	10.13	14.62	16.27	"		34770	
5.14	2.47	.48	10.22	14.33	15.96	"		34771	
3.19	2.10	.66	10.12	16.77	18.66	"		34772	
4.26	2.41	.56	9.76	14.68	16.27	"		34773	
5.63	2.42	.41	10.70	14.17	15.87	"		34776	
5.13	2.31	.45	9.97	14.10	15.36	"		34779	

A. C. LARIVIERE, INSPECTOR.

3.95	1.72	.44	9.94	13.27	14.13	Genuine		35871	
4.11	1.96	.48	9.86	15.61	17.32	"		35872	
4.60	2.06	.45	10.32	12.14	13.54	"		35873	
3.52	2.06	.59	9.95	13.95	15.50	"		35874	
3.97	1.51	.39	9.67	11.75	13.01	Wheat starch, 20 p.c.		35875	Adulterated.
3.20	2.26	.71	9.25	15.60	17.19	Genuine		35876	
5.47	2.72	.49	9.98	13.95	15.50	"		35877	
2.43	1.16	.48	9.69	10.50	11.63	Wheat starch, &c., 50 p.c.		35878	Ash low. Extractive low. Adulterated.
4.09	2.77	.07	9.43	15.51	17.13	Genuine		35879	
5.61	1.91	.34	10.69	11.07	12.40	Foreign matter, rice, &c., 5 p.c.		35880	Ash abnormal. Doubtful.

Date of Collection.	Nature of Sample.	Number of Sample.	Name and Address of Vendor.	Cost.		Name and Address of Manufacturer or Furnisher as given by the Vendor.	Inspector's Report. (Is not an expression of opinion).
				Quantity.	Cents.		

DISTRICT OF CALGARY—

1909.							
April 21	Ground Ginger.	28974	A. Brandelli, Calgary	3 tins.	30	G. F. & J. Galt, Ltd., Calgary.	
" 21	"	28975	Golden West Grocery, Calgary.	3 "	30	"	
" 21	"	28976	W. Maitland, Calgary.	3 pks.	30	Unknown	
" 21	"	28977	Hallett & Longdene, Calgary.	3 "	30	Georgesou & Co., Ltd., Calgary.	
" 22	"	28978	People Co-operative Store, Calgary.	3 "	30	Unknown	
" 22	"	28979	J. T. Macdonald, Calgary.	3 tins.	25	Daeton Bros., Toronto	
" 22	"	28980	Speer Bros., Calgary	3 "	30	Red Feather Co., Hamilton.	
" 22	"	28981	Watson's Grocery, Calgary.	1/2 lb.	30	Great West Spice Mills, Winnipeg.	
" 22	"	28982	W. Verrier, Calgary.	3 pks.	30	Campbell, Wilson & Horne, Ltd., Calgary	
" 22	"	28983	McLellan & Hawkes, Calgary.	3 tins.	30	W. V. Moore, Ltd., Calgary.	

DISTRICT OF VANCOUVER—

Mar. 23	Ground Ginger.	37581	Granville Grocery, Vancouver.	3 tins.	30	E. R. Burke & Co., U.S.	
" 24	"	37582	R. Schilling, Vancouver.	3 "	30	Empress Mfg. Co., Vancouver.	Full strength...
" 24	"	37583	Mrs. C. H. Scott, Vancouver.	1/2 lb.	30	Unknown	
" 24	"	37584	S. F. McCready, Vancouver.	3 tins.	30	Braid & Co., Vancouver.	Guaranteed absolutely pure.
" 24	"	37585	C. Groth, Vancouver	3 "	38	Oriental Mills, Vancouver.	Full strength...
" 24	"	37586	J. McArthur, Vancouver.	1/2 lb.	30	Unknown	
" 24	"	37587	J. Donald & Co., Vancouver.	3 tins.	30	Kelly, Douglas & Co., Vancouver.	"Columbia" ...
" 24	"	37588	R. Acriman, Vancouver.	1/2 lb.	30	W. H. Malkin, Vancouver.	
" 29	"	37634	Adams & Dean, New Westminster.	3 tins.	25	S. Leiser & Co., Victoria.	Guaranteed free from adulterations.
" 29	"	37635	Gunderson & Anne, New Westminster.	1/2 lb.	30	Empress Mfg. Co., Vancouver.	

DISTRICT OF VICTORIA—

April 27	Ground Ginger.	39316	Windsor Grocery Co., Victoria, B.C.	3 pks.	30	Pioneer Coffee & Spice Mills, Victoria.	Empire.....
" 27	"	39317	Saunders Grocery Co., Ltd., Victoria, B.C.	3 "	30	R. P. Rithet & Co., Victoria.	St. James.....
" 28	"	39318	Cous & Young, Victoria, B.C.	1/2 lb.	30	Victoria Coffee and Spice Mills, Victoria.	
" 28	"	39319	W. Speed, Victoria, B.C.	3 pks.	30	Blue Ribbon Mfg. Co., Winnipeg.	Blue Ribbon.....

GROUND GINGER.

ASH.			RESULTS OF ANALYSIS.					Number of Sample.	Remarks and Opinion of the Chief Analyst.
Total.	Water Soluble.	Ratio.	Moisture.	Cold Water Extractive. Normal	Calcu- lated to Dry Ginger	Microscope.			
3.53	2.43	.69	9.84	16.90	18.75	Genuine	28974		
3.45	2.42	.70	9.75	16.75	18.56	"	28975		
4.66	2.43	.52	9.42	13.20	15.23	"	28976		
5.64	2.76	.49	9.92	12.81	14.22	"	28977		
2.00	1.42	.71	9.68	10.08	11.16	Maize starch, 25 p.c.	28978	Ash low. Adulterated.	
2.18	0.98	.45	10.71	12.43	13.92	Maize and wheat starch, 25 p.c.	28979	" "	
4.97	2.74	.56	9.31	15.18	16.74	Genuine	28980		
5.32	2.52	.47	9.96	12.46	13.84	"	28981		
3.28	1.80	.55	9.58	14.61	16.16	"	28982		
2.60	1.31	.50	11.51	11.04	12.47	Maize and wheat starch, 15 p.c.	28983	Ash low. Adulterated.	

R. W. FLETCHER, INSPECTOR.

p.c.	p.e.	p.c.	p.c.	p.c.	p.c.				
3.53	2.43	.69	9.84	16.90	18.75	Genuine	28974		
3.45	2.42	.70	9.75	16.75	18.56	"	28975		
4.66	2.43	.52	9.42	13.20	15.23	"	28976		
5.64	2.76	.49	9.92	12.81	14.22	"	28977		
2.00	1.42	.71	9.68	10.08	11.16	Maize starch, 25 p.c.	28978	Ash low. Adulterated.	
2.18	0.98	.45	10.71	12.43	13.92	Maize and wheat starch, 25 p.c.	28979	" "	
4.97	2.74	.56	9.31	15.18	16.74	Genuine	28980		
5.32	2.52	.47	9.96	12.46	13.84	"	28981		
3.28	1.80	.55	9.58	14.61	16.16	"	28982		
2.60	1.31	.50	11.51	11.04	12.47	Maize and wheat starch, 15 p.c.	28983	Ash low. Adulterated.	

J. F. POWER, INSPECTOR.

5.12	2.46	.48	10.30	13.08	14.58	Genuine	37581	
4.46	2.06	.46	10.98	14.44	16.22	"	37582	
4.92	2.07	.42	9.23	15.36	16.92	"	37583	
5.42	2.18	.40	11.68	15.83	17.92	"	37584	
7.72	2.62	.34	10.80	14.07	15.77	"	37585	Cao=2.76. Ash insol. in HCl. =0.35. Ash abnormal; high
4.52	1.89	.42	9.65	13.36	14.97	"	37586	
4.65	1.98	.43	11.58	14.37	16.25	"	37587	
5.62	2.16	.39	9.60	13.62	15.07	"	37588	
5.61	2.46	.44	10.80	10.94	12.26	"	37634	Low extractive. Doubtful.
5.10	2.02	.39	9.20	14.40	15.86	"	37635	

D. O'SULLIVAN, INSPECTOR.

4.29	2.39	.56	11.80	11.00	12.47	Genuine	39316	Extractive low. Doubtful.
5.74	1.99	.35	11.05	13.73	15.44	"	39317	Ash abnormal.
5.13	2.52	.49	10.30	10.98	12.24	"	39318	Extractive low. Doubtful.
3.27	2.36	.72	10.24	16.87	18.90	"	39319	

Date of Collection.	Nature of Sample.	Number of Sample.	Name and Address of Vendor.	COST.		Name and Address of Manufacturer or Furnisher as given by the Vendor.	Inspector's Report. (Is not an expression of opinion).
				Quantity.	Cents		

DISTRICT OF VICTORIA—

1909.							
April 28	Ground Ginger.	39320	Fred Carne, Victoria, B.C.	3 pks.	30	E. R. Durkee & Co., New York, U.S.A.	Gauntlet
" 28	" ..	39321	Jalland Bros., Victoria, B.C.	3 " ..	30	W. A. Jameson Coffee Co., Victoria.	Victoria
" 28	" ..	39322	Wm. B. Hall, Victoria, B.C.	3 " ..	30	A. Shilling & Co., San Francisco, Cal.	Shilling's Best
" 28	" ..	39323	The West End Grocery Co., Ltd., Victoria, B.C.	3 bots.	75	Crosse & Blackwell, London, Eng.	.....
" 29	" ..	39324	W. A. Jameson Coffee Co., Victoria, B.C.	1 lb ..	25	F. F. Dalley Co., Hamilton, Ont.	.....
" 29	" ..	39325	E. G. Bailey, Victoria, B.C.	3 pks.	30	Empress Mfg. Co., Vancouver, B.C.	Empress

NOTE.—The word "Genuine," under Microscopic Examination, has reference only to the microscopic characteristics. It does not mean that the sample is genuine, except so far as botanical structure is concerned. This would not be materially affected by extraction of the article with cold water.

The percentage of foreign starch, &c., as stated under Microscopic Examination, must be regarded as approximate only. It is estimated by comparing microscopic fields with similar fields of mixtures containing known amounts of foreign material.

GROUND GINGER.

Total.	ASH.		RESULTS OF ANALYSIS.					Number of Sample.	Remarks and Opinion of the Chief Analyst.
	Water Soluble.	Ratio.	Moisture.	Cold Water Extractive.	Normal	Calcu- lated to Dry Ginger	Microscope.		
5.40	2.62	.49	10.73	13.15	14.73	Genuine. ....	.....	39320	
5.78	2.00	.35	11.56	14.55	16.46	" .....	.....	39321	Ash abnormal.
3.47	2.56	.72	12.09	16.84	19.15	" .....	.....	39322	
3.24	2.26	.68	10.45	17.87	19.96	" .....	.....	39323	
3.93	2.25	.59	9.85	13.44	14.91	" .....	.....	39324	
4.28	2.21	.52	12.96	13.92	16.00	" .....	.....	39325	

D. O'SULLIVAN, INSPECTOR—Conclud ed.

p.e.	p.e.	p.e.	p.e.	p.e.	p.e.				
5.40	2.62	.49	10.73	13.15	14.73	Genuine. ....	.....	39320	
5.78	2.00	.35	11.56	14.55	16.46	" .....	.....	39321	Ash abnormal.
3.47	2.56	.72	12.09	16.84	19.15	" .....	.....	39322	
3.24	2.26	.68	10.45	17.87	19.96	" .....	.....	39323	
3.93	2.25	.59	9.85	13.44	14.91	" .....	.....	39324	
4.28	2.21	.52	12.96	13.92	16.00	" .....	.....	39325	